List	of	Fig	ures
------	----	-----	------

	Figure	Page	
Figure 1.1: The crystal structure of hexagonal single crystal graphite,			
	in which the two distance planes of carbon hexagons called		
	A and B planes are stacked in an ABAB sequence.	25	
	Figure 1.2: Structure of MWCNTs.	26	
	Figure 1.3: Structure of SWCNTs.	27	
	Figure 3.1: Schematic diagram of gas phase treatment using UTP reactor.	56	
	Figure 3.2: Gas phase treatment using UTP reactor.	56	
	Figure 3.3: The diagram of refluxing purified MWCNTs.	57	
	Figure 3.4: The flow chart of liquid phase treatment.	57	
	Figure 3.5: Diagram of adsorption experiment.	63	
	Figure 3.6: Schematic diagram of ICPMS instrument.	64	
	Figure 3.7: Standard calibration for ICPMS.	65	
	Figure 3.8: Flow chart of work program.	68	
	Figure 4.1: The EDX spectrum of (a) Pristine MWCNTs (b) Purified MWCNTs	70	
	Figure 4.2: The SEM images of (a) Pristine MWCNTs (b) Purified MWCNTs	71	
	Figure 4.3: The HRTEM images of (a) agglomerated Pristine MWCNTs		
	(b) Pristine MWCNTs shows the thick amorphous carbon		
	(c) MWCNTs were loosely packed and showed open end after		
	purification process (d) Purified MWCNTs shows reduced		
	thickness of amorphous carbon.	72	
	Figure 4.4: The acid-base titration profile for (a) B6 (b) B7 (c) B8.	76	
	Figure 4.5: The acid-base titration profile for (a) B9 (b) B10 (c) B11.	78	

Figure 4.6: Thermogravimetric curve of (a) gas phase (b) liquid phase	
functionalized sample.	80
Figure 4.7: Mass spectroscopy of gas phase functionalized sample	
(a) B6, treated at 100 $^{\circ}$ C for 2hrs (b) B7, treated at 200 $^{\circ}$ C for 2hrs	
(c) B8, treated at 300 °C for 2hrs.	82
Figure 4.8: Mass spectroscopy of liquid phase functionalized sample	
(a) B9, treated at 100 $^{\circ}$ C for 2hrs (b) B10, treated at 200 $^{\circ}$ C for 2hrs	
(c) B11, treated at 300 °C for 2hrs.	83
Figure 4.9: IR spectra of pristine and purified MWCNTs.	85
Figure 4.10: IR spectra of (a) gas phase (b) liquid phase functionalized samples.	88
Figure 4.11: X-ray diffraction patterns of pristine and purified MWCNTs.	89
Figure 4.12: X-ray diffraction patterns of (a) gas phase (b) liquid phase	
functionalized samples.	91
Figure 4.13: Raman scattering spectra of (a) gas phase (b) liquid phase	
functionalized samples	93
Figure 4.14: Nitrogen adsorption-desorption isotherm of (a) gas phase	
(b) liquid phase functionalized samples.	97
Figure 4.15: Pore size distribution of (a) gas phase (b) liquid phase	
functionalized samples.	100
Figure 4.16: HRTEM images of gas phase treated sample at $100 ^{\circ}$ C (B6)	
are shown above. The loosely packed and show very little	
amorphous carbon on the surface. Also visible are surface defects.	102
Figure 4.17: The HRTEM images of gas phase treated sample at 200 $^{\circ}$ C (B7)	
are shown above. The overview of open-ended MWCNTs caps.	
The defective region of B7 samples.	103

Figure 4.18: The HRTEM image of gas phase treated sample at 300 $^{\circ}$ C (B8)	
is shown above.	104
Figure 4.19: The HRTEM images of liquid phase treated sample at 100 $^{\circ}$ C (B9)	
are shown above. Physical defective region on the outer wall	
of MWCNTs surfaces and debrislike higly disordered carbon.	105
Figure 4.20: The HRTEM images of liquid phase treated sample at 200 $^{\circ}$ C (B10)	
are shown above. Narrow tubular morphology of MWCNTs is	
shown. Physical defective region on the outer wall of MWCNTs	
surfaces.	106
Figure 4.21: The TEM images of liquid phase treated sample at 300 $^{\circ}$ C (B11)	
are shown above.	107
Figure 4.22: The effect of initial concentration on the adsorption of mercury (II)	
ions by Pristine, B7 (gas phase) and B10 (liquid phase) adsorbent.	
[Conditions; adsorbent dose: 0.3000g; pH: 6; contact time: 6 hours;	
temperature: 25 $^{\circ}$ C; agitation rate = 180 rpm].	109
Figure 4.23: Linear plot of Langmuir Isotherm for pristine MWCNTs sample.	
[Conditions; adsorbent dose: 0.3000g; pH: 6; contact time: 6 hours;	
temperature: 25 $^{\circ}$ C; agitation rate = 180 rpm].	113
Figure 4.24: Linear plot of Freundlich Isotherm for pristine MWCNTs sample.	
[Conditions; adsorbent dose: 0.3000g; pH: 6; contact time: 6 hours;	
temperature: 25 $^{\circ}$ C; agitation rate = 180 rpm].	113
Figure 4.25: Linear plot of Langmuir Isotherm for B7 sample.	
[Conditions; adsorbent dose: 0.3000g; pH: 6; contact time: 6 hours;	
temperature: $25 \degree C$ ; agitation rate = 180 rpm].	115

Figure 4.26: Linear plot of Freundlich Isotherm for B7 sample.

[Conditions; adsorbent dose: 0.3000g; pH: 6; contact time: 6 hours; temperature: 25 °C; agitation rate = 180 rpm]. 115 Figure 4.27: Linear plot of Langmuir Isotherm for B10 sample.

> [Conditions; adsorbent dose: 0.3000g; pH: 6; contact time: 6 hours; temperature: 25 °C; agitation rate = 180 rpm]. 117

Figure 4.28: Linear plot of Freundlich Isotherm for B10 sample.

[Conditions; adsorbent dose: 0.3000g; pH: 6; contact time: 6 hours; temperature: 25 °C; agitation rate = 180 rpm]. 117